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ABSTRACT:

A heat radiating element (10) for use with a perimeter or baseboard heating system comprises a plurality of heating element parts (14, 16) removably secured to a fluid carrying conduit (12) at various locations along the length of the conduit (12). The parts (14, 16) are secured by bolts or resilient elements.

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F28F 1/30

(52) UK CL (Edition J)
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(56) Documents cited
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GB 1169522 A GB 1099687 A EP 0009458 A1

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UK CL (Edition J) F4S
INT CL⁴ F28D, F28F

(54) Heat radiating element

(57) A heat radiating element (10) for use with a perimeter or baseboard heating system comprises a plurality of heating element parts (14, 16) removably secured to a fluid carrying conduit (12) at various locations along the length of the conduit (12). The parts (14, 16) are secured by bolts or resilient elements.

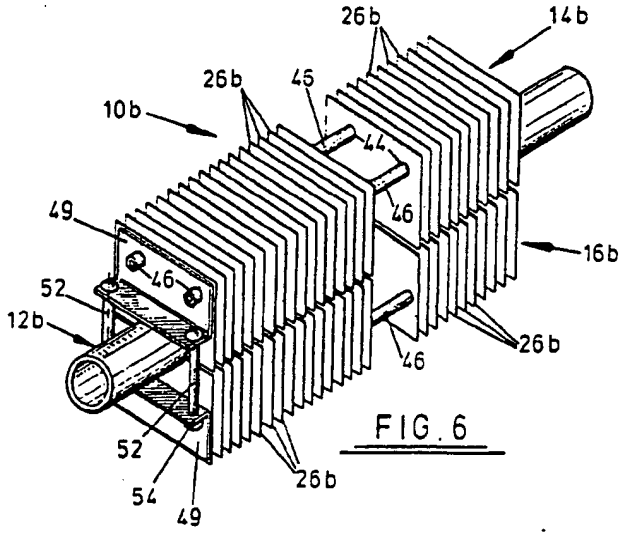

FIG. 6

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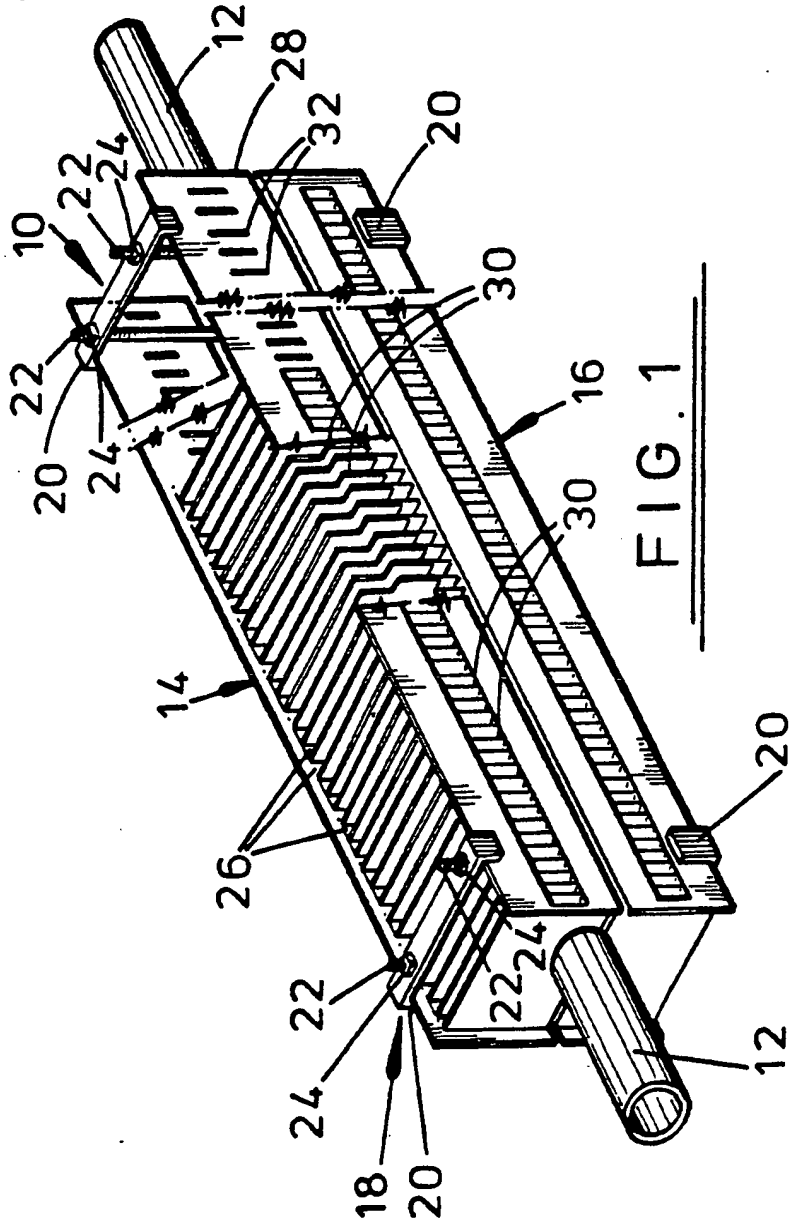

FIG. 1

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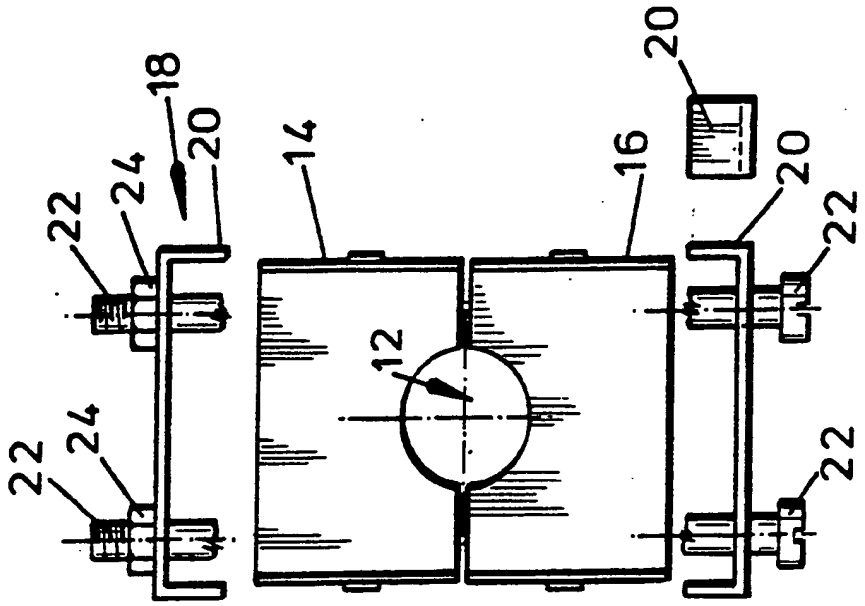

FIG. 3

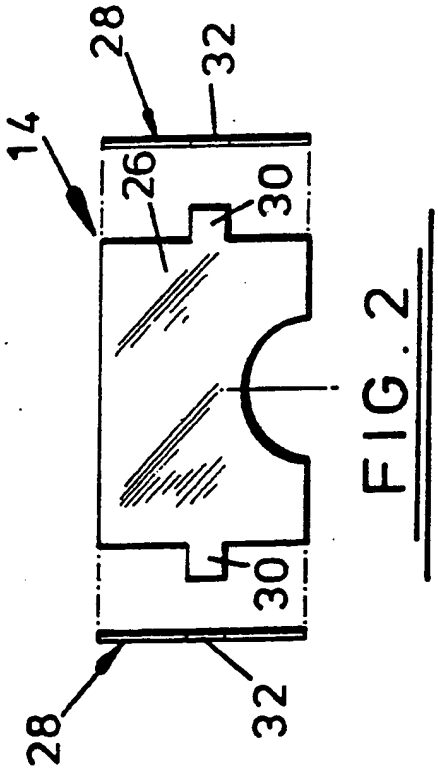

FIG. 2

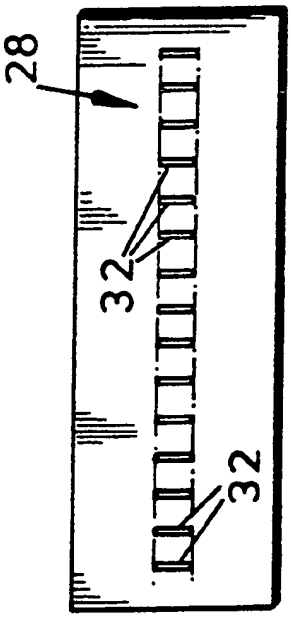

FIG. 2A

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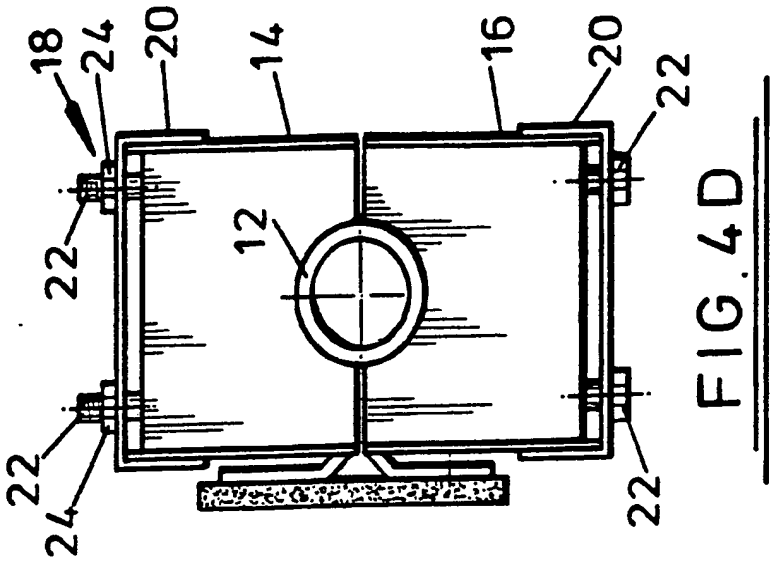

FIG.4D

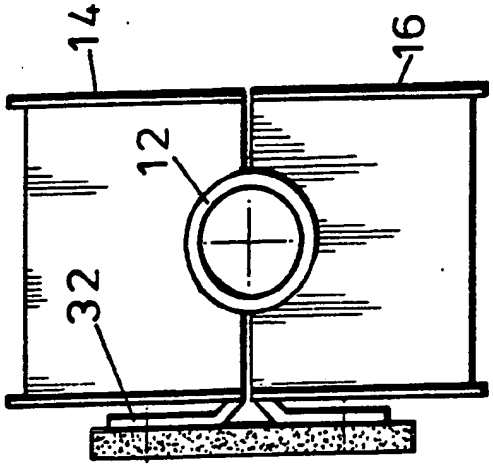

FIG.4C

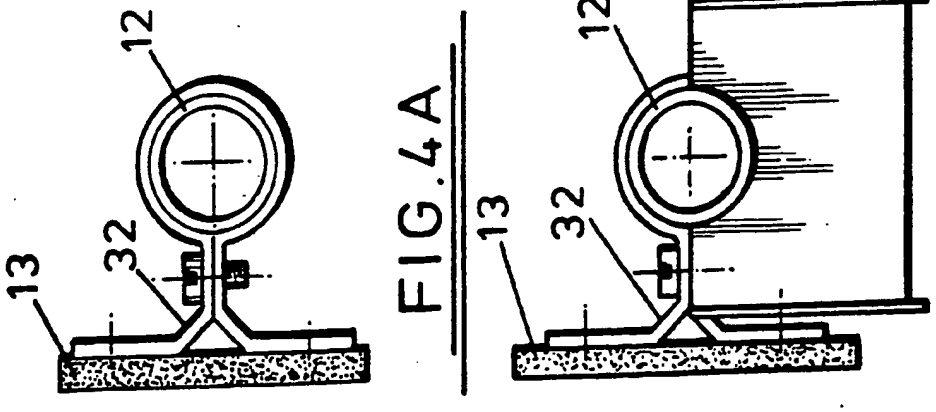

FIG.4A

FIG.4B

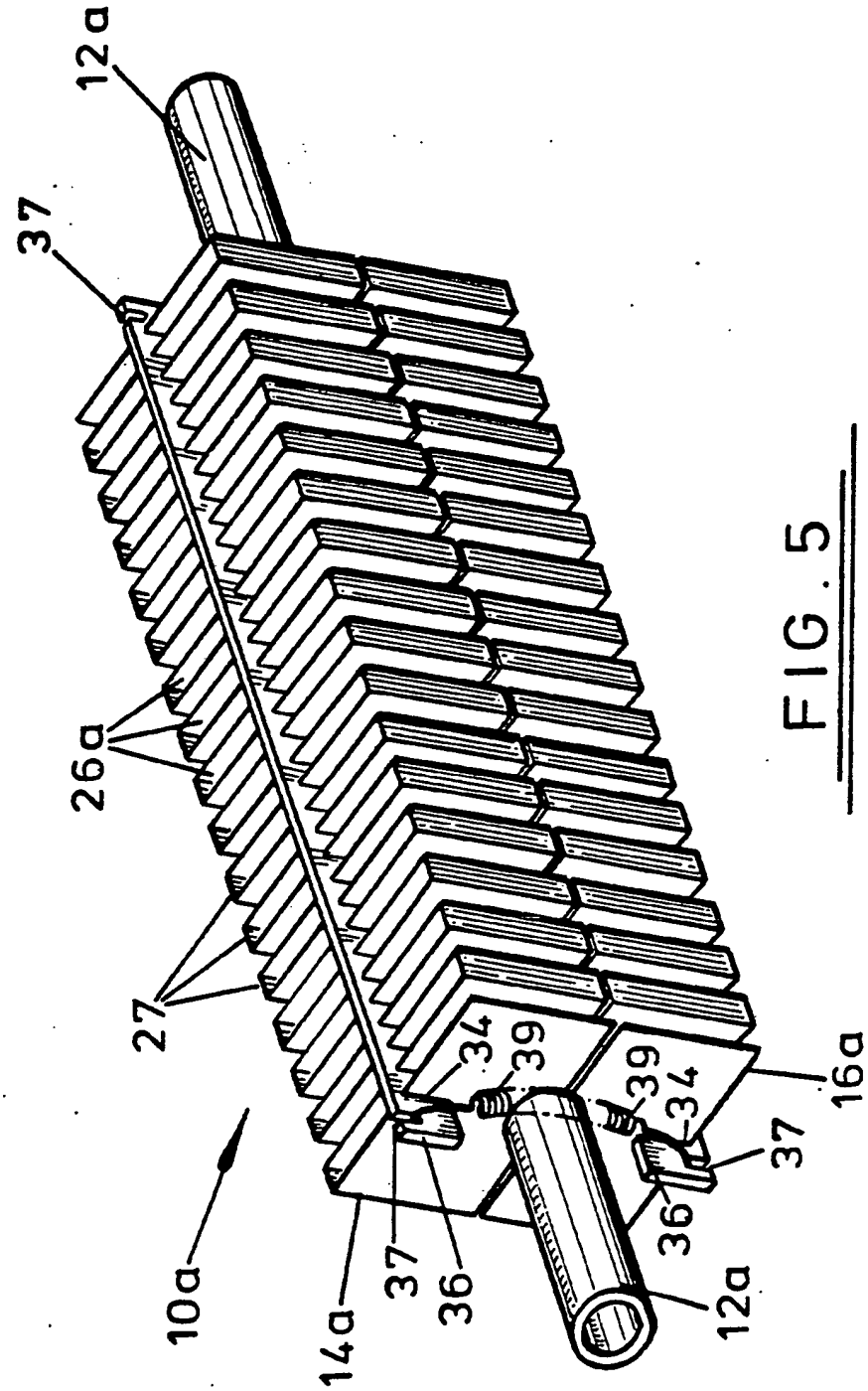

FIG. 5

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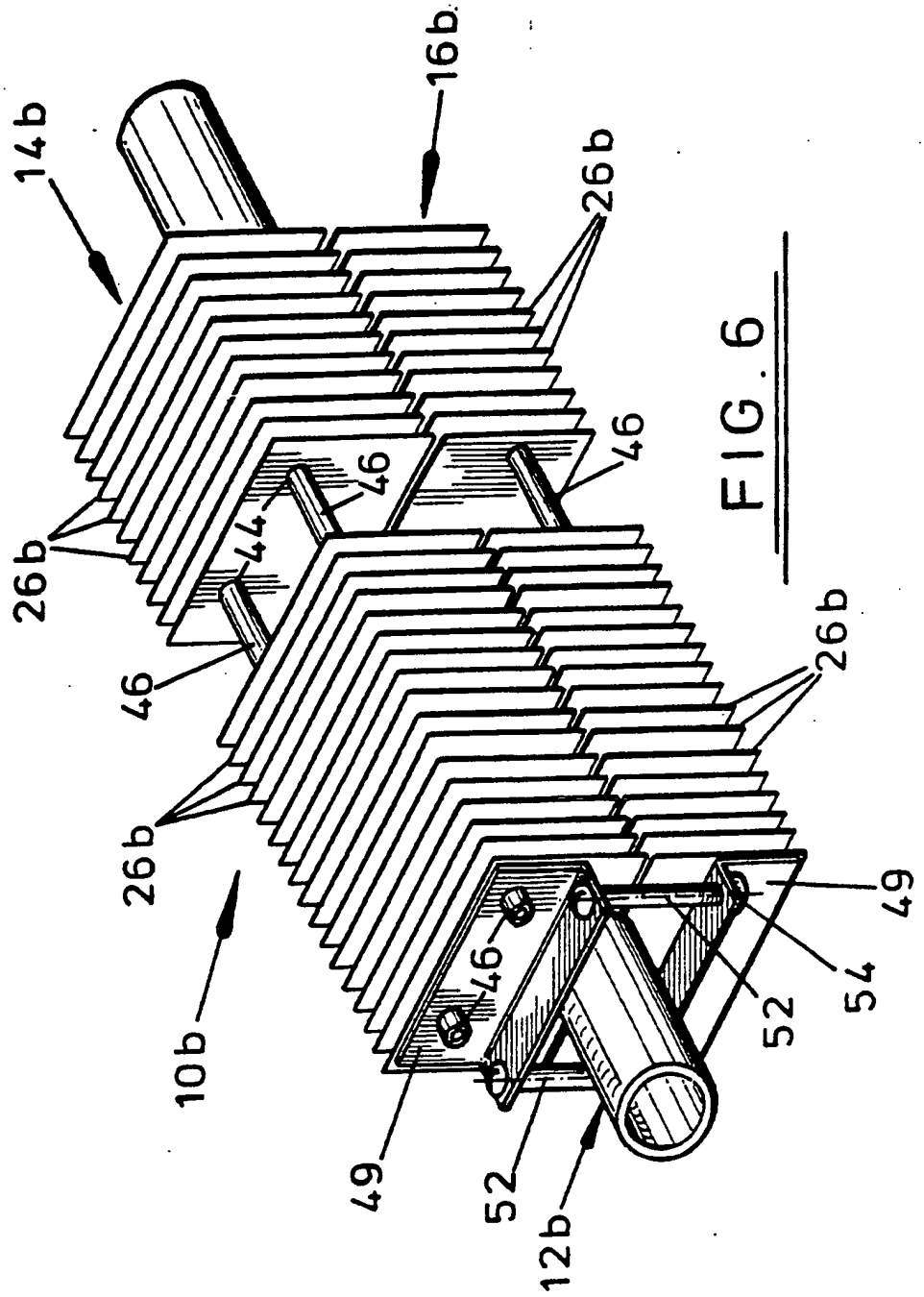

FIG. 6

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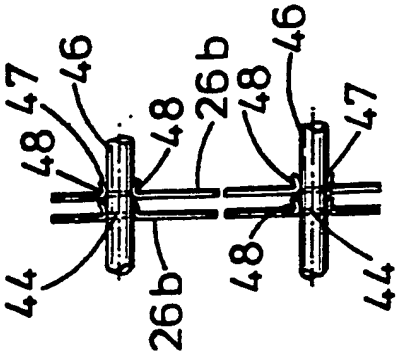

FIG.7

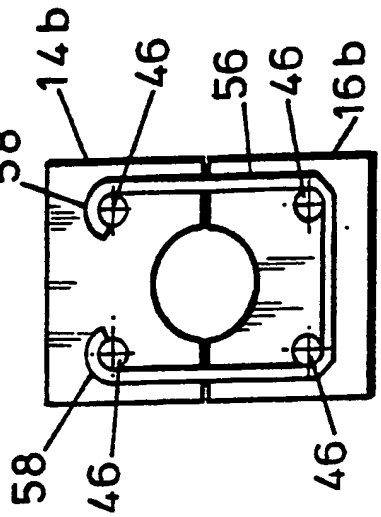

FIG.10

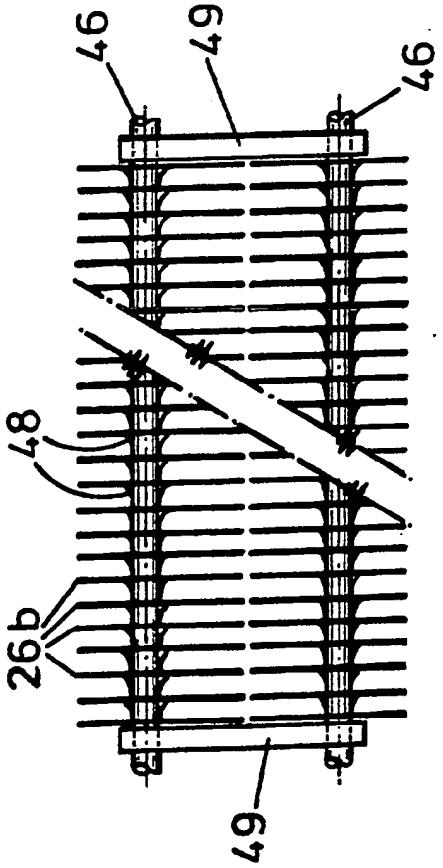

FIG.8

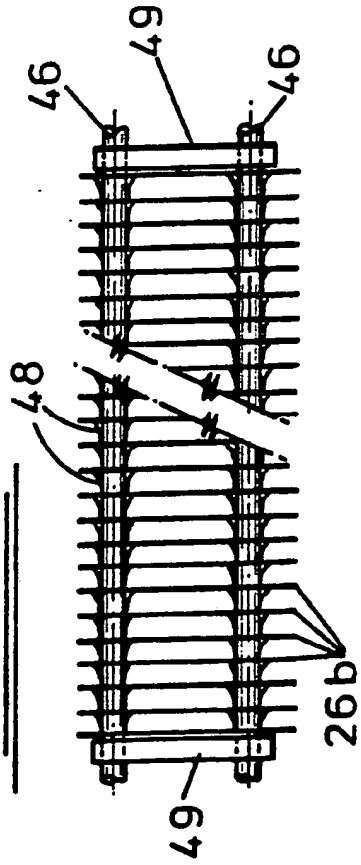

FIG.9

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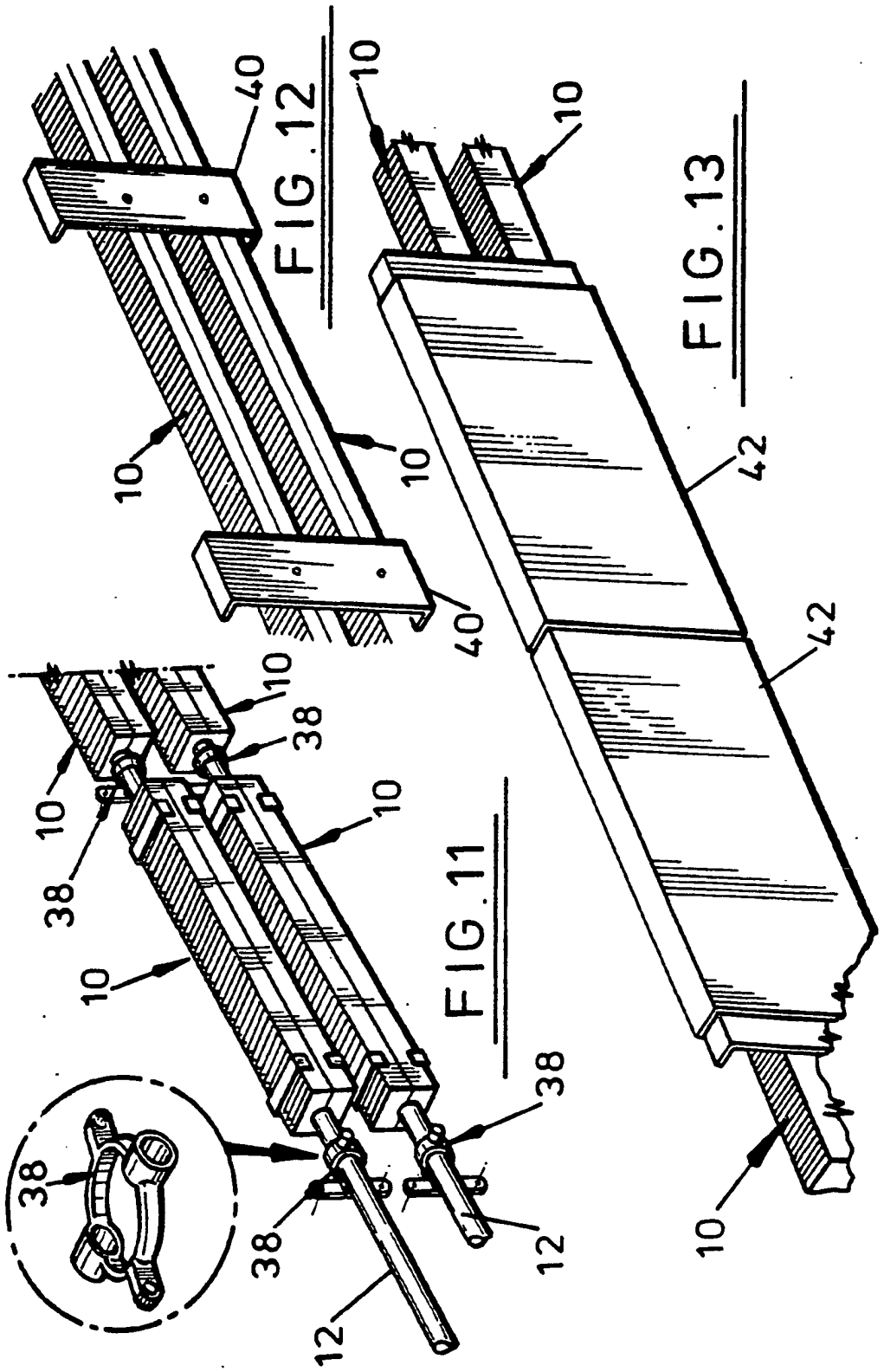

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HEAT RADIATING ELEMENT

The present invention relates to a heat radiating element and particularly, but not exclusively to a heat radiating element for use with a perimeter or baseboard heating system.

A heat radiating element should satisfy a number of desirable criteria in addition to being relatively inexpensive and easy to manufacture. The heat radiating element should provide a heat output which satisfies the heating requirements of the area in which it is installed. The size and capacity of the heat radiating element should be variable and the heat radiating element should provide an efficient thermally conductive link between the fluid being carried in a pipe and the surroundings, to result in efficient heat transfer from the fluid to the surrounding environment.

One type of existing heat radiating element includes a series of aluminium fins which are expanded on to specially drawn copper tubes, the expansion process bringing the copper tube up to standard sizes to take standard fittings. Having to use specially drawn copper increases the cost of manufacture and the installation of such a heat radiating element is complicated. In addition, when changes to the heating surfaces are required, in some systems the "draining down" of fluid carrying elements is necessary and the cutting of

pipework is generally unavoidable. In addition, when the heat radiating elements are being installed, most existing heat radiating elements require to be installed on a "first fix" basis and, as these heat radiating elements are installed early, they may be damaged as the building continues. This results in considerable site labour and care must be taken, on site, not to damage the heat radiating elements.

An object of the present invention is to provide a heat radiating element which obviates or mitigates at least one of the aforementioned problems.

This is achieved by providing a modular multi-part heat radiating element which can be removably secured to a fluid carrying conduit at various locations along the length of the conduit.

In a preferred embodiment the modular heat radiating element is provided by two elongate heat radiating sections, an upper section and a lower section, detachably mounted on opposite sides of a heating conduit. These upper and lower sections of the heat radiation elements are clamped together and held in place around the conduit. Each section has a plurality of parallel spaced apart heating plates which lie in a plane generally perpendicular to the conduit axis. Each plate has two apertures for receiving an expandable light gauge tube. The apertures have 'star burst' portions which engage the outer surfaces of the tube

when the tubes are expanded so that the plates are secured to the tubes and are spaced from each other along the tubes forming a substantially rigid upper or lower section.

In an alternative embodiment of the heat radiating element, heat radiating plates of each section are connected to each other by integral links which also act as plate spacers. The two piece heat radiating element can be clamped together using springs to be held in thermally conducting contact with the conduit.

According to a first aspect of the present invention there is provided a heat radiating element for use with a conduit for carrying a fluid, said element having a plurality of heating element parts adapted to be detachably secured around said conduit, each element part comprising a plurality of heat radiating means spaced apart along said conduit for radiating heat to the surrounding environment, said heating element parts being secured to said conduit by fastening means to secure said heating element parts in thermally conductive contact with said conduit.

Preferably said heat radiating means are provided by thermally conductive heat radiating plates.

Preferably said heat radiating element consists of two separate parts adapted to be coupled to each other, each part being connected in thermal contact with said conduit.

Preferably said fastening means are provided by a detachable fastening device which secures said upper and lower parts of said heat radiating element together in thermally conductive contact with said conduit.

According to a second aspect of the present invention there is provided a method of installing a heat radiating element on a conduit comprising the steps of:-

disposing a first part of a heat radiating element on the surface of said conduit;

disposing a second part of the heat radiating element on said conduit, and

releasably securing the first and second parts of the heat radiating element together.

Preferably said first and second parts are releasably secured by a bolt and nut fastening while said first and second parts are disposed on the surface of said conduit.

Alternatively said first and second parts are releasably secured by connecting said first and second parts together by a flexible fastener while said first and second parts are disposed on the surface of said conduit.

These and other aspects of the present invention will become apparent from the following description when

taken in combination with the accompanying drawings in which:-

Fig. 1 is a perspective view of a first embodiment of a heat radiating element in accordance with the present invention;

Figs. 2 and 2a are exploded elevational views of some of the parts of the heat radiating element shown in Fig. 1;

Fig. 3 is an exploded end elevational view of some other parts of the heat radiating element shown in Fig. 1 in a generally assembled condition;

Figs. 4a,b,c and d are end elevational views of sequential stages during assembly of the heat radiating element shown in Fig. 1;

Fig. 5 is a perspective view of a second embodiment of a heat radiating element in accordance with the present invention;

Fig. 6 is a perspective view of a third embodiment of a heat radiating element in accordance with the present invention;

Fig. 7 is a side elevational view of part of the heat radiating element shown in Fig. 6;

Fig. 8 is a partial elevational view of the heat radiating element shown in Fig.s 6 and 7;

Fig. 9 is a partial plan view of the heat radiating element shown in Fig. 6 to 8;

Fig. 10 is an end elevational view of a heat

radiating element similar to that shown in Fig.s 6 to 9 with an alternative fastening arrangement;

Fig. 11 is a perspective view of a heat radiating elements shown in Fig. 1, mounted on a conduit of baseboard heating system;

Fig. 12 is a perspective view of some heat radiating elements coupled by support plates, and

Fig. 13 is a perspective view of the heat radiating elements shown in Fig. 7 with a cover mounted over the support plates.

Reference is firstly made to Fig. 1 of the drawings which is a perspective view of an embodiment of a heat radiating element, generally indicated by reference numeral 10, which provides heat radiation from a fluid carried in a conduit in the form of a copper tube or pipe 12. As fluid flows along the pipe 12, the heat contained in the fluid is transferred by the element 10 to the environment in which the heat radiating element 10 is installed.

The heat radiating element 10 comprises an upper part 14 and a lower part 16. The upper part 14 and the lower part 16 are fastened together, both in thermal contact with the pipe 12, by two fastening devices 18, one disposed at each end of the heat radiating element 10. Each fastening device 18 holds the upper part 14 and lower part 16 together by brackets 20 being disposed on the upper part 14 and lower part 16 and the brackets

20 being detachably coupled to each other by bolts 22 and nuts 24. As best shown in Fig. 3 the heat radiating element 10 can be easily removed from pipe 12 by releasing nuts 24 and removing the brackets 20. The upper part 14 and lower part 16 are substantially identical and in the interest of clarity and convenience only upper part 14 will be described in detail.

Reference is now made to Figs. 1, 2 and 2a of the drawings which show the constituent parts of the upper part 14 of heat radiating element 10. The upper part 14 comprises a plurality of heat radiating plates 26 which are coupled to each other, and spaced at equal intervals along pipe 12, by thermally conductive side plates 28. The heat radiating plates 26 each have two integral tongues 30 which locate in slots 32 of side plates 28. When so located the tongues 30 are then bent through 90° to lie on the surface of side plates 28 as best shown in Fig. 1, to provide an assembly which forms upper part 14.

Reference is now made to Figs. 4a - d of the drawings which are elevational views of three stages of assembly of a heat radiating element 10 on a pipe 12 coupled to wall 13 by a bracket assembly 28. In the first stage of assembly, shown in Fig. 4b, a lower part 16 of heat radiating element 10, is held to abut the underside of pipe 12. The second stage of assembly, shown in Fig. 4c, involves placing upper part 14 of heat radiating element 10 to abut the top of pipe 12. In the

third and final stage of assembly, shown in Fig. 4d, the upper part 14 and lower part 16 of heat radiating element 10 are fastened together by locating fastening unit 18 in place around the element 10, fastening nuts 24 onto bolts 22 to hold brackets 20 in place. These stages of assembly can be reversed to remove the heat radiating element 10 from the pipe 12.

Reference is now made to Fig. 5 of the drawings which shows an alternative embodiment of the heat radiating element 10a where like numerals refer to like parts with the suffix 'a' added. The heat radiating element 10a comprises upper part 14a and lower part 16a. The upper part 14a and lower part 16a are substantially identical and both have single serpentine plates which can be regarded as a plurality of heat radiating plates 26a separated by integral webs 27. Each plate of upper and lower parts 14a and 16a has a slot 34 which are aligned in the serpentine structure to define an elongate slot which runs through all plates 26a, and parallel to the pipe 12a. A fastening bar 36 is disposed in each elongate slot. The fastening bars 36 of the upper and lower parts have hooks 37 at their end to permit the bars to be fastened together by a spring 39 attached between hooks 37 of locating bars 36.

Reference is now made to Fig. 6 to 9 of the drawings which show a further embodiment of a heat radiating

element 10b where like numerals refer to like parts with the suffix 'b' added. The heat radiating element 10b comprises upper part 14b and lower part 16b. The upper and lower parts 14b, 16b are substantially identical having a plurality of heat radiating plates 26b spaced apart along pipe 12b as will be described.

Each plate 26b has two apertures 44 for receiving light gauge tubes 46 as best shown in Fig. 7. Each aperture 44 is formed by punching the plate 26b at desired locations to create 'star burst' portions 48. Each 'star burst' portion 48 defines a opening for receiving an expandable tube 46. When the tube 46 is passed through apertures 44 of adjacent plates 26b as shown in Figs. 7 to 9, the tube 46 is expanded in accordance with known teachings, so that its outer surface engages the inner surfaces 47 of 'star-burst' portions 48. When the tubes 46 are so expanded the adjacent plates 26b are securely located on tubes 46 to form a rigid structure for the upper part 14b or the lower part 16b of the element 10b. The leading edge of the star burst portion 48 of each radiating plate 26b abuts the adjacent radiating plate 26b thus determining the spacing between adjacent plates 26b on pipe 12b.

Tubes 46 also pass through apertures in L-shaped end brackets 49 which are in register with aperture 44. To couple the upper and lower parts 14b, 16b in thermally conductive contact with pipe 12b, the end brackets 49

are connected by threaded bolts 52 and nuts 54.

Reference is now made to Fig. 10 of the drawings which shows an alternative fastening arrangement for fastening the heat radiating element 10b to the pipe 12b. A generally U-shaped resilient bracket 56 is coupled to the upper and lower parts 14b, 16b as shown to hold these parts in contact with pipe 12b. Hooks 58 of bracket 56 releasably secure the bracket 56 to upper tubes 46 so that the bracket 56 secures the upper and lower parts 14b, 16b to the pipe 12b.

Reference is now made to Figs. 6, 7 and 8 of the drawings which are perspective views of the heat radiating elements 10, in use, in a perimeter or baseboard heating system. The pipes 12 are coupled to a wall by cast brass double ring pipe brackets 38 as shown in Fig. 6. The double ring pipe bracket 38 can be used to provide additional support for heat radiating elements 10 as will be described. Connecting plates 40, shown in Fig. 7 are mounted on pipe brackets 38 using countersunk screws into threaded bosses on the pipe bracket 38. The connecting plates 40 align the heat radiating elements 10 and prevent the elements 10 from being twisted around the pipe 12. These plates 40 can be thermally conductive and are also used to provide a support for aesthetic thermal convective panelling 42, shown in Fig. 8.

Various modifications can be made to the embodiments

hereinbefore described without departing from the scope of the invention. The heat radiating plates and side plates can be made of steel or copper and similarly a steel pipe may be used. The fastening unit may be provided by a clamp which could be attached to any or all pairs of the element upper parts and lower parts respectively. The side plates may be coupled to the heat radiation plates by being welded into place providing a single upper part and lower part of the heat radiating element to be secured to the pipe. In addition, the upper part and lower part of the heat radiating element may be hinged together at one side to form a heat radiating element which may be fitted around the pipe in one stage of assembly, the element having a fastening device attached to the opposite side of the element. The double ring pipe bracket can be modified to provide depth adjustment to allow for variations in wall dimensions and all of the rings can be mounted on a common back plate to ensure they are in line. The hooks may be tied together by wire or any other similar material instead of using spring. Also the heat radiating plates may be disposed parallel to the pipe and the upper and lower parts with the parallel heat radiating elements could be fastened together in a similar manner to the upper and lower parts which have heat radiating plates perpendicular to the pipe.

Advantages associated with the present invention are

that; the heat radiating element is readily assembled and manufactured, and which is relatively inexpensive. The size and heat output of the element can be varied by changing the size of heat radiation elements, and consequently the number of heat radiating plates which are installed. An efficient thermally conductive link with a fluid carrying pipe is established, providing efficient heat transfer from the pipe to the plates. There is no need to use specially drawn copper pipes as normal copper piping can be used. When the heating element requires maintenance or adjustment it is easily removed from the pipe without the necessity of having to drain the system. The use of convection panels minimises direct heat on the front plates.

In the embodiment using exapandable tubes as the securing means the rigid structure obtained facilitates on-site assembly and fabrication and means that the heating elements can be literally 'made to measure' on site.

The heat radiating elements can be installed at any time and so a plumber may install plain copper piping and test the system before installing the heat radiating elements. This results in considerable saving in site labour and also the danger of potential damage to the heat radiating elements during building work is minimised if the heat radiating elements are installed at a later date. Utilising a standard pipe bracket to

support panelling for the elements also reduces the expense of installing the system.

CLAIMS

1. A heat radiating element for use with a conduit for carrying a fluid, said element having a plurality of heating element parts adapted to be detachably secured around said conduit, each element part comprising a plurality of heat radiating means spaced apart along said conduit for radiating heat to the surrounding environment, said heating element parts being secured to said conduit by fastening means to secure said heating element parts in thermally conductive contact with said conduit.

2. A heat radiating element as claimed in claim 1 wherein said heat radiating means are provided by thermally conductive heat radiating plates.

3. A heat radiating element as claimed in claim 1 or claim 2 wherein said heat radiating element consists of two separate parts adapted to be coupled to each other, each part being connected in thermal contact with said conduit.

4. A heat radiating element as claimed in any of claims 1 to 3 wherein said heat radiating plates are spaced along said conduit.

5. A heat radiating element as claimed in claim 4 wherein adjacent heat radiating plates are coupled by securing means.

6. A heat radiating element as claimed in claim 5 wherein said securing means are provided by at least one

tube which extends through apertures of each of said heat radiating plates and which is expanded to be secured to each plate to form a rigid structure.

7. A heat radiating element as claimed in claim 6 wherein said apertures are provided by 'star burst' punchings in said plates and said tube is expandable in said apertures to secure said plates to said tube.

8. A heat radiating element as claimed in claim 5 wherein said securing means are provided by thermally conductive side plates.

9. A heat radiating element as claimed in claim 8 wherein said side plates are held in place by tongues integral with said heat radiating plates, said tongues being located in slots in said side plates.

10. A heat radiating element as claimed in claim 5 wherein said securing means are provided by integral webs linking each plate to at least one adjacent plate.

11. A heat radiating element as claimed in any one of claims 2 to 10 wherein said heat radiating plates are made of aluminium or copper.

12. A heat radiating element as claimed in any preceding claim wherein said fastening means are provided by a detachable fastening device which secures said upper and lower parts of said heat radiating element together in thermally conductive contact with said conduit.

13. A heat radiating element as claimed in claim 12 wherein

said fastening device is a generally 'U'-shaped bracket having hooks which are received by protruding end portions of the tubes of said upper and lower parts.

14. A heat radiating element as claimed in any one of claims 3 to 13 wherein said two separate parts are hinged together at one side and fastened around said conduit by fastening means disposed at the opposite side from said hinge.

15. A heat radiating element as claimed in any preceding claim wherein said conduits are secured to a wall by removable brackets.

16. A heat radiating element as claimed in claim 15 wherein support means for supporting said heat radiating element in place are coupled to said brackets.

17. A method of installing a heat radiating element on a conduit comprising the steps of:-

disposing a first part of a heat radiating element on the surface of said conduit;

disposing a second part of the heat radiating element on said conduit, and

releasably securing the first and second parts of the heat radiating element together.

18. A method of installing a heat radiating element as claimed in claim 17 wherein said first and second parts are releasably secured by a bolt and nut fastening while said first and second parts are disposed on the surface of said conduit.

19. A method of installing a heat radiating element as claimed in claim 17 wherein said first and second parts are releasably secured by connecting said first and second parts together by a flexible fastener while said first and second parts are disposed on the surface of said conduit.

20. A heat radiating element substantially as hereinbefore described with reference to Figs. 1 to 4D and 11 to 13, or to Fig. 5, or to 6 to 10 of the accompanying drawings.

21. A method of installing a heat radiating element substantially as hereinbefore described.

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